HARRIS ENTERPRISES LLC

Providing professional traffic crash reconstructions.

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Traffic Crash Reconstruction Report
Prepared for Melissa Self, GEICO Insurance Company
GEICO Claim Number: 0160341600101061
Harris Enterprises LLC Case Number R19-350

David Harris of Harris Enterprises LLC was contacted by Tracy Sale of GEICO Insurance Company regarding a crash that occurred in Fairmont, WV. This crash occurred on Country Club Road in Fairmont and involved a Fairmont Police Department pickup truck being used as a cruiser and a Subaru Forrester.

There has not been a police report released as of the date of this report, however, it is being investigated by the Marion County Sheriff's Department. Marion County Sheriff's Department called Monongalia County Sheriff's Department to perform a reconstruction on this case, as the driver of the Subaru died as a result of this crash. I have not been provided with any documentation from the Monongalia County Reconstruction Team, however I was told by the investigating officer from Marion County, Deputy Pigott, that the officers from Monongalia County did forensically map the scene and downloaded the airbag control module from Dodge Ram 2500 pickup truck involved in this vehicle, however, he was not of the opinion that they performed a complete reconstruction in this case. Deputy Pigott requested that I share my findings with him, and they would share all their information with me, as he wanted this to be an open and transparent investigation. I called Ms. Sale, who requested guidance from her supervisors, and the decision was made that information would be shared once my report had been completed. It should also be noted that Deputy Pigott contacted me about this case after I had been retained by GEICO for assistance, and I informed him that I had already been retained by GEICO for this case. Deputy Pigott provided me the opportunity to download the airbag control module for the pickup truck, after having been given permission from the Marion County Prosecutor's Office, and permission was granted from the insurance company for Fairmont Police Department and by the Fairmont Police Department as well. I did image the data contained in that module, and it will be discussed later in this report. Information that was provided to me was as follows: The police cruiser, a Ram 2500 pickup truck, was traveling on Country Club Road. The car, a Subaru Forrester, was traveling on Bison Street, and attempting to turn left onto Country Club Road. The pickup truck struck the car broadside. There were concerns about the speed of the pickup truck as well as concerns regarding whether or not the car stopped prior to beginning its turn onto Country Club Road.

Scene Investigation

I conducted a scene investigation consisting of forensically mapping the scene using a total station, as well as photographing the scene. Copies of the photos will be provided to GEICO Insurance Company with this report, along with copies of the diagrams. Photo 1 shows a view of the scene similar to the view driver of the pickup truck would have had.

Photo 1

This view is from the direction the truck came from, and is looking towards the intersection with Bison Street, where the car came out of.

Photo 2 below shows a view from Bison Street looking towards the direction the truck was coming from.

Photo 2

This view shows the view similar to what the driver of the car would have had. Included in this photo are the two Marion County Reserve Police officers who assisted with traffic control during the time that we were at the scene of the crash.

Photo 3 below shows the post-impact skid marks from both vehicles shown from the viewpoint looking from the area of final rest towards impact for both vehicles.

Photo 3

Notice in Photo 3 that impact appears to have occurred near the center line of the roadway. This is shown better in a closer view, in Photo 4.

Photo 4

Photo 4 was taken from the direction of the pickup truck. Notice the gouge mark indicated by the **red** arrow. Further investigation revealed that this mark was made by the left front wheel of the Subaru involved in this crash. This viewpoint is from the direction the pickup truck was traveling looking towards final rest.

Vehicle Inspections

I was permitted to inspect both vehicles involved in this collision. They were both stored at the Marion County Sheriff's Department Impound lot. I was permitted to measure, photograph, and inspect both vehicles. Photo 5 below shows the pickup truck involved in this collision.

Photo 5

Photo 5 shows the front and driver's side of the pickup truck involved in this collision. Notice that the damage is more severe towards the driver's side than the passenger side, which is shown below in Photo 6. This is due to the angle of impact and the direction the car was traveling relative to the direction of the pickup truck.

Photo 6

In looking at Photo 6 above, the difference in the passenger side and driver's side damage is easily seen. Evidence of a secondary impact for the pickup truck is shown below in Photo 7.

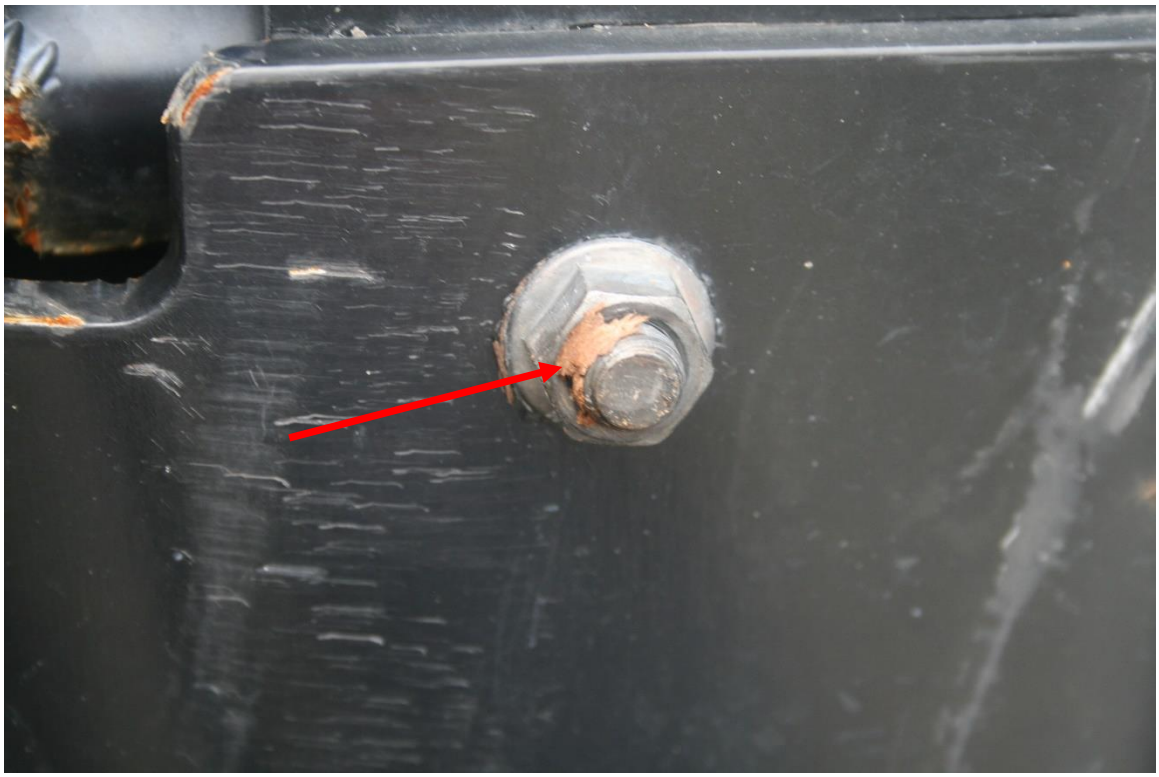


Photo 7

Photo 7 shows wood stuck on the bolt holding the brush guard on the driver's side of the front of the pickup truck. The pickup truck did strike the telephone pole after striking the car, as evidenced by this, the pole showing damage and being moved, as well as the download report, which will be discussed later in this report. The wood is indicated by the **red** arrow.

It also needs to be noted that during the inspection of the truck, it was shown that the original tire size has been changed to one size larger. It is unknown if the computer in the truck was changed to reflect the tire size. The difference this could make would be that the vehicle could be traveling faster than what is reported by the vehicle.

Photo 8 below shows the driver's side of the car involved in this crash.

Photo 8

Photo 8 shows the driver's side of the Subaru involved in this crash. One can see where the driver's side upright of the brush guard of the pickup truck struck the car during maximum engagement. This is indicated by the **red** arrow. It also appears that the passenger side upright on the brush guard struck the car where the **yellow** arrow indicates. This alignment also indicates that the center of mass of the pickup truck nearly lines up with the center of mass of the car. Evidence of a secondary impact for the car is shown below in Photo 9.

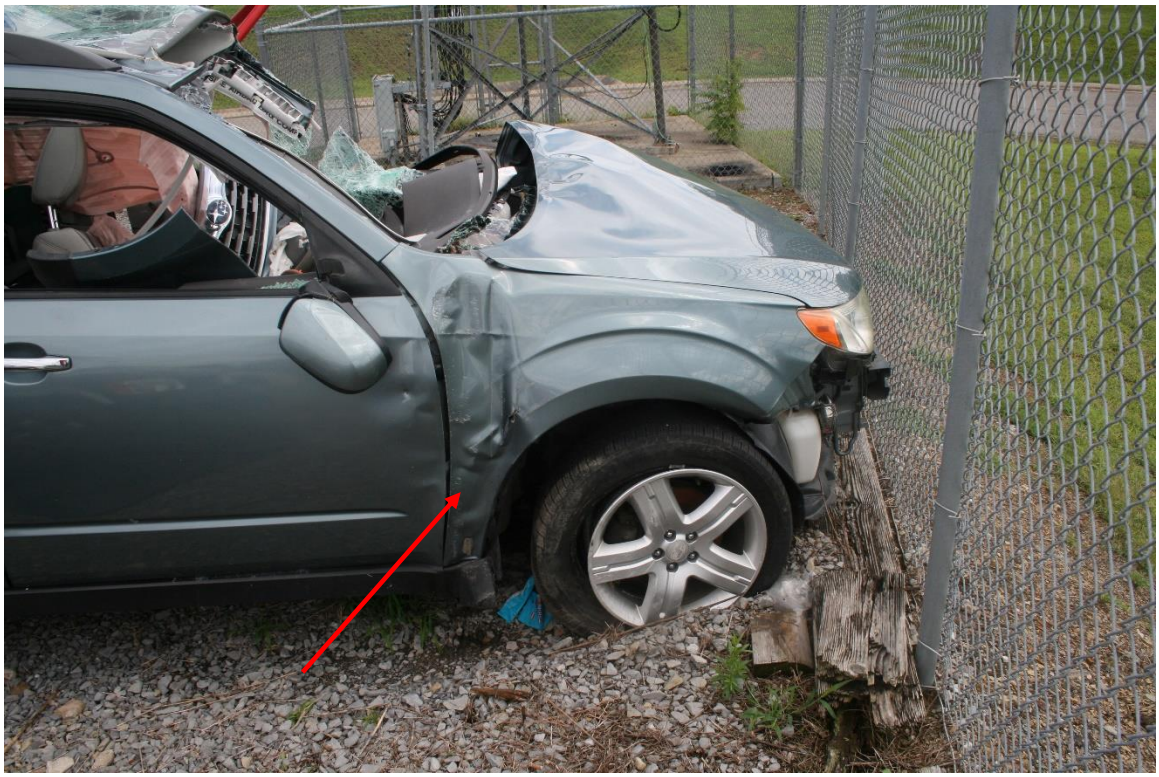


Photo 9

The secondary impact for this vehicle was with a pole located in front of building where the car came to final rest. The damage from the secondary impact is indicated by the **red** arrow.

The Download Report

I imaged the data contained in the airbag control module of the pickup truck involved in this collision. A copy of that report will be forwarded on to GEICO Insurance Company with this report. This download was performed at the Marion County Sheriff's Office with permission from the Prosecuting Attorney of Marion County, along with permission from the insurance company representing Fairmont Police Department.

The first section of this report to be discussed is shown below.

CDR File Information

User Entered VIN	3C6TR5CT3GG243207
User	David C Harris
Case Number	R19-350
EDR Data Imaging Date	08/23/2019
Crash Date	07/10/2019
Filename	3C6TR5CT3GG243207_ACM.CDRX
Saved on	Friday, August 23 2019 at 11:20:56
Imaged with CDR version	Crash Data Retrieval Tool 19.0
Imaged with Software Licensed to (Company Name)	Harris Enterprises LLC
Reported with CDR version	Crash Data Retrieval Tool 19.0
Reported with Software Licensed to (Company Name)	Harris Enterprises LLC
EDR Device Type	Airbag Control Module
Event(s) recovered	Most Recent Event 1st Prior Event

The VIN shown on this report is a user entered VIN, which means that I entered the VIN provided to me by Deputy Pigott. This is shown in the **red** block. In looking further at this block of information, one can see there were two events captured by the airbag control module. This is shown in the **blue** block.

The next section is taken from the Data Limitations Section of the download report.

- The following table provides an explanation of the sign notation for data elements that may be included in this CDR report. All directional references to sign notation are from the perspective of the driver when seated in the vehicle facing the direction of forward vehicle travel.

Data Element Name	Positive Sign Notation Indicates
Delta-V, Longitudinal	Forward
Maximum Delta-V, Longitudinal	Forward
Delta-V, Lateral	Left to Right
Maximum Delta-V, Lateral	Left to Right
Angular Rate	Clockwise rotation around the longitudinal axis
Peripheral Sensors, X and Y	Outside to Inside
Pressure Sensors	Compression of air
Internal Y Acceleration	Left to Right
Low-g Z Acceleration	Downward
Steering Input	Steering wheel turned counter clockwise
Yaw Rate	Counter clockwise rotation

The reason this is shown above in two different blocks is that it was continued from one page to another and was copied and pasted in different blocks. This data defines which direction will give a positive notation with different blocks of data.

System Status at Retrieval

Original VIN	3C6TR5CT3GG243207
Ignition Cycle, Download	5613
ACM Part Number	68346749AB
ECU Serial Number	T52MD364504026
ACM Supplier	Bosch
ECU Supply Voltage at Time of Retrieval	11.9

System Configuration at Retrieval

Configured for Driver Frontal Airbag	Yes
Configured for Passenger Airbag	Yes
Configured for Driver Retractor Pretensioner	Yes
Configured for Passenger Retractor Pretensioner	Yes
Configured for Left Side Curtain Airbag	Yes
Configured for Right Side Curtain Airbag	Yes
Configured for Front Left Seat Airbags	Yes
Configured for Front Right Seat Airbag	Yes
Configured for Safety Belt Status, Driver	Yes
Configured for Safety Belt Status, Outboard Front Passenger	No
Configured for Seat Track Position Switch, Foremost, Status, Driver	No
Configured for Seat Track Position Switch, Foremost, Status, Outboard Front Passenger	No
Configured for Rollover Sensing	Yes

These sections show the system status at the time of retrieval, which means when the module was downloaded. Remember, this was a desktop download meaning the module had been removed from the vehicle. The module was clamped to a desktop to prevent it from moving when the download was performed.

System Status at Event (Most Recent Event)

Event Number	2
Multi-Event, Number of Events (1,2)	2
Total number of events	2
Time from Event 1 to 2 (Time since last event)(sec)	1.54
Complete File Recorded (Yes, No)	Yes
Maximum Delta-V Longitudinal (MPH [km/h])	-3.7 [-6]
Time, Maximum Delta-V, Longitudinal (msec)	134
Maximum Delta-V Lateral (MPH [km/h])	-6.2 [-10]
Time, Maximum Delta-V, Lateral (msec)	146
Ignition Cycle, Crash	5607
Safety Belt Status, Driver	Not Buckled
Airbag Warning Lamp, On/Off	Off
Operation System Time (sec)	8870328
Airbag Warning Lamp On Time Before Event (min)	0
Supply Voltage at Event, ACM (V)	13.4
Operation via Energy Reserve	No
VIN at Event (last 8 digits)	GG243207
Odometer at Event (km [miles])	39381 [24470.1]

This block shows the System Status at the most recent event. This is shown in the title section for this block and is in the **red** block. The event number shows that this is Event 2. The next two lines show that there were two events captured. These are shown in the **blue** block. The time from Event 1 to Event 2 was 1.54 seconds. This is shown in the **orange** block. The file was completely recorded, as shown in the **green** block. The maximum Delta-V (change in velocity/change in time) is shown in the **purple** block. This is for longitudinal and lateral Delta-V. The driver was not wearing the seatbelt, as shown in the **yellow** block. This section indicates that this was the second of two impacts, and is the secondary impact with the telephone pole, therefor, for purposes of this report, will not be used for any calculations. What will be used is the 1st Prior Event,

which is shown below. What can be done with the Most Recent Event is to compare the data to the 1st Prior Event if needed.

System Configuration at Event (1st Prior Event)

Configured for Driver Frontal Airbag	Yes
Configured for Passenger Airbag	Yes
Configured for Driver Retractor Pretensioner	Yes
Configured for Passenger Retractor Pretensioner	Yes
Configured for Left Side Curtain Airbag	Yes
Configured for Right Side Curtain Airbag	Yes
Configured for Front Left Seat Airbags	Yes
Configured for Front Right Seat Airbag	Yes
Configured for Safety Belt Status, Driver	Yes
Configured for Safety Belt Status, Outboard Front Passenger	No
Configured for Seat Track Position Switch, Foremost, Status, Driver	No
Configured for Seat Track Position Switch, Foremost, Status, Outboard Front Passenger	No
Configured for Rollover Sensing	Yes

This section shows the configuration for the 1st Prior Event. This is very similar to the configuration for the Most Recent Event.

System Status at Event (1st Prior Event)

Event Number	1
Multi-Event, Number of Events (1,2)	1
Total number of events	2
Time from Event 1 to 2 (Time since last event)(sec)	>5
Complete File Recorded (Yes, No)	Yes
Maximum Delta-V Longitudinal (MPH [km/h])	-22.4 [-36]
Time, Maximum Delta-V, Longitudinal (msec)	104
Maximum Delta-V Lateral (MPH [km/h])	-5.0 [-8]
Time, Maximum Delta-V, Lateral (msec)	106
Ignition Cycle, Crash	5607
Safety Belt Status, Driver	Not Buckled
Airbag Warning Lamp, On/Off	Off
Operation System Time (sec)	8870327
Airbag Warning Lamp On Time Before Event (min)	0
Supply Voltage at Event, ACM (V)	13.5
Operation via Energy Reserve	No
VIN at Event (last 8 digits)	GG243207
Odometer at Event (km [miles])	39381 [24470.1]

This block shows the System Status at the 1st Prior Event. This is shown in the **yellow** block. This is the first of two recorded events. This is shown in the **blue** block. There was greater than 5 seconds between this event and any other prior event, if one existed. This is show in the **orange** block. The maximum Delta-V longitudinal and lateral as well as the change in time are shown in the **red** block.

Deployment Command Data (1st Prior Event)

Driver Frontal Airbag Commanded	Yes
Driver Front Airbag, Time to 1st stage (msec)	18
Driver Front Airbag, Time to 2nd Stage from T0 (msec)	78
Passenger Frontal Airbag Commanded	Yes
Passenger Front Airbag, Time to 1st stage (msec)	18
Passenger Front Airbag, Time to 2nd Stage from T0 (msec)	48
Commanded Driver Retractor Pretensioner Deployment	Yes
Commanded Passenger Retractor Pretensioner Deployment	Yes
Commanded Left Side Curtain Airbag Deployment	No
Commanded Left Seat Airbag Deployment	No
Commanded Right Side Curtain Airbag Deployment	No
Commanded Front Right Side Seat Airbag Deployment	No

This block shows the timing of the deployment. This is significant because the airbag system itself is predictive in nature, as it must be in order to be effective. The first stage of the deployment occurred at 18 milliseconds into the event. The second stage was deployed at 78 milliseconds into the event. The passenger side bag deployed in 48 milliseconds, which is even faster. This is shown in the **green** block. The airbags need to be deployed by about 50 milliseconds into the event in order to be inflated prior to the occupant striking the bag to minimize injury to the occupant. The second stage essentially slows down the deflation of the bags by putting a smaller, second charge into the bag.

Longitudinal Crash Pulse (1st Prior Event)

Time (msec)	Delta-V, Longitudinal (MPH [km/h])
0	0.0 [0]
2	0.0 [0]
4	0.0 [0]
6	-0.6 [-1]
8	-0.6 [-1]
10	-1.2 [-2]
12	-1.9 [-3]
14	-1.9 [-3]
16	-2.5 [-4]
18	-3.1 [-5]
20	-3.7 [-6]
22	-4.3 [-7]
24	-5.6 [-9]
26	-6.8 [-11]
28	-7.5 [-12]
30	-8.1 [-13]
32	-8.7 [-14]
34	-9.3 [-15]
36	-10.6 [-17]
38	-11.2 [-18]
40	-11.8 [-19]
42	-12.4 [-20]
44	-13.0 [-21]
46	-13.0 [-21]
48	-13.7 [-22]
50	-14.3 [-23]
52	-14.9 [-24]
54	-15.5 [-25]
56	-15.5 [-25]
58	-15.5 [-25]
60	-16.2 [-26]
62	-16.2 [-26]
64	-16.2 [-26]
66	-16.8 [-27]
68	-16.8 [-27]
70	-16.8 [-27]
72	-17.4 [-28]
74	-18.0 [-29]
76	-18.0 [-29]
78	-18.6 [-30]
80	-18.6 [-30]
82	-19.3 [-31]
84	-19.9 [-32]
86	-19.9 [-32]
88	-20.5 [-33]
90	-20.5 [-33]
92	-21.1 [-34]
94	-21.1 [-34]
96	-21.1 [-34]
98	-21.7 [-35]

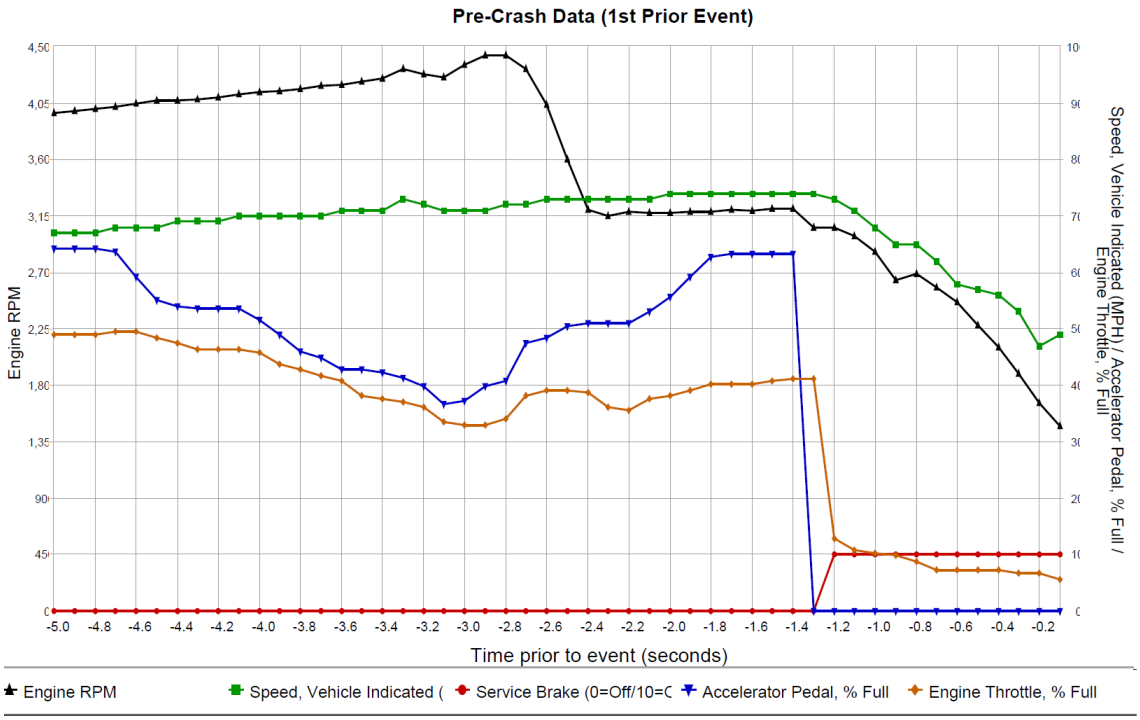
Time (msec)	Delta-V, Longitudinal (MPH [km/h])
100	-21.7 [-35]
102	-21.7 [-35]
104	-22.4 [-36]
106	-22.4 [-36]
108	-22.4 [-36]
110	-22.4 [-36]
112	-22.4 [-36]
114	-22.4 [-36]
116	-22.4 [-36]
118	-22.4 [-36]
120	-22.4 [-36]
122	-22.4 [-36]
124	-22.4 [-36]
126	-22.4 [-36]
128	-22.4 [-36]
130	-22.4 [-36]
132	-22.4 [-36]
134	-22.4 [-36]
136	-22.4 [-36]
138	-22.4 [-36]
140	-22.4 [-36]
142	-22.4 [-36]
144	-22.4 [-36]
146	-22.4 [-36]
148	-22.4 [-36]
150	-22.4 [-36]
152	-22.4 [-36]
154	-22.4 [-36]
156	0.0 [0]
158	0.0 [0]
160	0.0 [0]
162	0.0 [0]
164	0.0 [0]
166	0.0 [0]
168	0.0 [0]
170	0.0 [0]
172	0.0 [0]
174	0.0 [0]
176	0.0 [0]
178	0.0 [0]
180	0.0 [0]
182	0.0 [0]
184	0.0 [0]
186	0.0 [0]
188	0.0 [0]
190	0.0 [0]
192	0.0 [0]
194	0.0 [0]
196	0.0 [0]
198	0.0 [0]

This chart shows the Delta-V reported every 2 milliseconds. In looking at this chart, the maximum longitudinal value of -22.4 MPH was achieved in 104 milliseconds. This is shown in the **red** block. The longitudinal value means the X axis, or front to back. The negative sign denotes direction, meaning the vehicle slowed down. The next chart shows the lateral Delta-V.

Lateral Crash Pulse (1st Prior Event)

Time (msec)	Delta-V, Lateral (MPH [km/h])	Time (msec)	Delta-V, Lateral (MPH [km/h])
0	0.0 [0]	100	-4.3 [-7]
2	0.0 [0]	102	-4.3 [-7]
4	0.0 [0]	104	-4.3 [-7]
6	0.0 [0]	106	-5.0 [-8]
8	0.0 [0]	108	-5.0 [-8]
10	0.0 [0]	110	-5.0 [-8]
12	0.0 [0]	112	-5.0 [-8]
14	0.0 [0]	114	-5.0 [-8]
16	0.0 [0]	116	-5.0 [-8]
18	0.0 [0]	118	-5.0 [-8]
20	0.0 [0]	120	-5.0 [-8]
22	0.0 [0]	122	-5.0 [-8]
24	0.0 [0]	124	-5.0 [-8]
26	0.0 [0]	126	-5.0 [-8]
28	0.0 [0]	128	-5.0 [-8]
30	0.0 [0]	130	-5.0 [-8]
32	0.0 [0]	132	-5.0 [-8]
34	0.0 [0]	134	-4.3 [-7]
36	0.0 [0]	136	-4.3 [-7]
38	0.0 [0]	138	-4.3 [-7]
40	0.0 [0]	140	-4.3 [-7]
42	0.0 [0]	142	-4.3 [-7]
44	0.0 [0]	144	-4.3 [-7]
46	0.0 [0]	146	-4.3 [-7]
48	0.0 [0]	148	-4.3 [-7]
50	0.0 [0]	150	-4.3 [-7]
52	0.0 [0]	152	-4.3 [-7]
54	0.0 [0]	154	-4.3 [-7]
56	0.0 [0]	156	0.0 [0]
58	0.0 [0]	158	0.0 [0]
60	0.0 [0]	160	0.0 [0]
62	0.0 [0]	162	0.0 [0]
64	0.0 [0]	164	0.0 [0]
66	-0.6 [-1]	166	0.0 [0]
68	-0.6 [-1]	168	0.0 [0]
70	-0.6 [-1]	170	0.0 [0]
72	-1.2 [-2]	172	0.0 [0]
74	-1.2 [-2]	174	0.0 [0]
76	-1.2 [-2]	176	0.0 [0]
78	-1.2 [-2]	178	0.0 [0]
80	-1.9 [-3]	180	0.0 [0]
82	-2.5 [-4]	182	0.0 [0]
84	-3.1 [-5]	184	0.0 [0]
86	-3.1 [-5]	186	0.0 [0]
88	-3.7 [-6]	188	0.0 [0]
90	-3.7 [-6]	190	0.0 [0]
92	-3.7 [-6]	192	0.0 [0]
94	-3.7 [-6]	194	0.0 [0]
96	-4.3 [-7]	196	0.0 [0]
98	-4.3 [-7]	198	0.0 [0]

The maximum lateral Delta-V is shown to be -5 MPH at 106 milliseconds. The negative sign denotes direction as shown in the chart from the Data Limitations Section. The reason that the Delta-V's reported in this event are so important is that this is the ONLY data that is truly calculated in the airbag control module, and is independent of other values reported in this report, as they come from other places in the vehicle. This will become important and will be discussed later in this report.



The above graph shows the pre-impact data in graphical form. The service brake (in **red**) shows either on or off and does not indicate how hard the brakes were depressed, only if the brake circuit switch was off or on.

Pre-Crash Data (1st Prior Event - table 1 of 3)
(the most recent sampled values are recorded prior to the event)

Time Stamp (sec)	Pre-Crash Recorder Status	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal, % Full	Engine Throttle, % Full	Service Brake	Engine RPM	ABS Activity	Stability Control	Steering Input (deg)
-5.0	Complete	67 [108]	64	49	Off	3,970	No	On	-2
-4.9	Complete	67 [108]	64	49	Off	3,992	No	On	-1
-4.8	Complete	67 [108]	64	49	Off	4,005	No	On	0
-4.7	Complete	68 [109]	64	49	Off	4,023	No	On	0
-4.6	Complete	68 [110]	59	49	Off	4,051	No	On	0
-4.5	Complete	68 [110]	55	48	Off	4,072	No	On	1
-4.4	Complete	69 [111]	54	47	Off	4,073	No	On	1
-4.3	Complete	69 [111]	54	46	Off	4,077	No	On	-1
-4.2	Complete	69 [111]	54	46	Off	4,094	No	On	-5
-4.1	Complete	70 [112]	54	46	Off	4,125	No	On	-9
-4.0	Complete	70 [112]	52	46	Off	4,139	No	On	-10
-3.9	Complete	70 [112]	49	44	Off	4,148	No	On	-10
-3.8	Complete	70 [113]	46	43	Off	4,162	No	On	-10
-3.7	Complete	70 [113]	45	42	Off	4,188	No	On	-11
-3.6	Complete	71 [113]	43	41	Off	4,195	No	On	-11
-3.5	Complete	71 [114]	43	38	Off	4,227	No	On	-11
-3.4	Complete	71 [115]	42	38	Off	4,250	No	On	-13
-3.3	Complete	73 [118]	41	37	Off	4,325	No	On	-12
-3.2	Complete	72 [115]	40	36	Off	4,280	No	On	-7
-3.1	Complete	71 [114]	37	34	Off	4,260	No	On	-6
-3.0	Complete	71 [115]	37	33	Off	4,359	No	On	-6
-2.9	Complete	71 [114]	40	33	Off	4,429	No	On	-7
-2.8	Complete	72 [116]	41	34	Off	4,435	No	On	-7
-2.7	Complete	72 [116]	47	38	Off	4,325	No	On	-8
-2.6	Complete	73 [117]	48	39	Off	4,040	No	On	-9
-2.5	Complete	73 [117]	51	39	Off	3,600	No	On	-12
-2.4	Complete	73 [118]	51	39	Off	3,200	No	On	-13
-2.3	Complete	73 [117]	51	36	Off	3,151	No	On	-15
-2.2	Complete	73 [118]	51	36	Off	3,187	No	On	-18
-2.1	Complete	73 [118]	53	38	Off	3,177	No	On	-23
-2.0	Complete	74 [118]	56	38	Off	3,175	No	On	-24
-1.9	Complete	74 [118]	59	39	Off	3,187	No	On	-23
-1.8	Complete	74 [119]	63	40	Off	3,181	No	On	-22
-1.7	Complete	74 [119]	63	40	Off	3,203	No	On	-21
-1.6	Complete	74 [119]	63	40	Off	3,193	No	On	-21
-1.5	Complete	74 [119]	63	41	Off	3,208	No	On	-21
-1.4	Complete	74 [120]	63	41	Off	3,209	No	On	-17
-1.3	Complete	74 [120]	0	41	Off	3,062	No	On	-4
-1.2	Complete	73 [117]	0	13	On	3,062	No	On	-12
-1.1	Complete	71 [114]	0	11	On	2,988	No	On	-8
-1.0	Complete	68 [110]	0	10	On	2,869	No	On	6
-0.9	Complete	65 [105]	0	10	On	2,642	Yes	On	6
-0.8	Complete	65 [104]	0	9	On	2,690	Yes	On	10
-0.7	Complete	62 [99]	0	7	On	2,578	Yes	On	15
-0.6	Complete	58 [93]	0	7	On	2,464	Yes	On	38
-0.5	Complete	57 [92]	0	7	On	2,279	Yes	On	34
-0.4	Complete	56 [90]	0	7	On	2,104	Yes	On	6
-0.3	Complete	53 [85]	0	7	On	1,896	Yes	On	-16
-0.2	Complete	47 [76]	0	7	On	1,663	Yes	On	-26
-0.1	Complete	49 [80]	0	6	On	1,477	Yes	On	-24

The above chart shows the pre-impact data shown in the previous graph, along with other pertinent information including steering input (in degrees) and anti-lock brake system activity. Notice that there is not a time 0 shown. If it were shown, the time 0 would represent impact, however, that is not displayed in this chart. The speed indicated may or may not be under-reported prior to the brakes being applied in this situation due to the tire size being changed, and it is unknown if this was changed in the computer of the truck. One can see when looking at the brake switch circuit status that the -1.2 second row, the status goes from off to on, meaning this is when the brakes were applied. This is the reaction to the driver of the truck seeing the car as a hazard. This is shown in the **blue** block. The speed reported at -1.2 seconds prior to impact is 73 MPH. In looking at the speeds reported after the brakes are applied, one can see the speeds

decreasing. The speeds reported are wheel speeds, not ground speed. One must look at the dynamics of the situation when determining what the actual speeds would be. In this case, the vehicle begins and continues to skid or slide up to impact. The time shown and the speeds shown can be used to calculate a drag factor for this vehicle during this skid. When doing this, if done block by block, a drag factor as high as 1.36 is calculated. This drag factor is unrealistic. If a drag factor is calculated out using the 1.2 seconds reported here, it is in excess of .9, which is also high, especially considering this vehicle is going downhill at the time of this event, which decreases the drag factor. What is going on at this time is the anti-lock brake system is active, and the vehicle is travelling at speeds greater than the wheels, as it is in a skid, but the wheels are still turning to allow some steering control of the vehicle. When looking at the accelerator pedal position at the -1.3 second row, you can see that the accelerator pedal position drops to 0%, from 63% in the -1.4 second row. This is shown in the **red** block.

Professional Opinion

I have looked at the evidence described above and considered all factors presented in this report. Several calculations have been performed using information obtained in this investigation and reconstruction. To calculate speeds, I have used the laws of sines and cosines to conserve linear momentum. I also obtained the weight of the pickup truck from the investigating officer, as he had a wrecker load the truck, and go through the scales, then go through the scales empty to get an accurate weight of the truck. I have arrived at the following conclusions:

- In a conversation with the investigating officer, it was revealed to me that the pickup truck, owned by the Fairmont Police Department, was not being operated as an emergency vehicle at the time of this crash. It may have been shortly before the crash, however, at the time of the crash was not.

- This crash occurred on Country Club Road, a 2-lane asphalt roadway with a 35 MPH posted speed limit.

- The download report was used to calculate the cumulative Delta-V of the pickup truck involved to be -22.95 MPH.

- Using the calculated Delta-V of the pickup truck, I calculated the Delta-V of the car to be 47.25 MPH.

- Using the download report, I calculated the principle direction of force for the truck (PDOF) to be 12.58 degrees.

- Using the calculated PDOF of the truck and the scale diagram prepared, I have calculated a PDOF of the car to be 53.82 degrees.

- Conserving linear momentum using the laws of sines and cosines, I have calculated the speed of the car at impact to be 14 MPH, +/- 2.5%.

- Conserving linear momentum using the laws of sines and cosines, I have calculated the impact speed of the pickup truck to be 60 MPH, +/- 2.5%.

- Using the reported speed of 73 MPH, which may be under-reported, during the time that the pickup truck was sliding, it covered 119.55 feet.

- A perception response time for the driver of the pickup truck was calculated to be between 1 and 1.5 seconds, according to Dr. Jeffrey Muttart's IDRR computer program.

- During the time frame of 1 second prior to the reaction the pickup truck covered at distance of at least 107 feet. The actual distance would be a bit further because there was a difference in the speed going from 73 MPH to 74 MPH, then back to 73 MPH which was treated like a constant speed of 73 MPH. This would benefit the driver of the pickup truck, as it is a shorter distance.

- Starting at that distance, then moving forward for one second at 35 MPH, the pickup covered 51.33 feet, then started braking.

- Had the driver of the pickup truck locked his brakes at the same time and using the same drag factor as calculated in the actual event, the driver of the pickup truck would have stopped the vehicle in 86.87 feet.

- The pickup truck could have stopped in excess of 80 feet prior to the location of impact.

- This crash would not have occurred if the driver of the pickup truck had been traveling the posted speed limit of 35 MPH.

- I was told that the driver of the car may or may not have stopped at the stop sign before entering the highway to make his left-hand turn. I cannot independently, definitively state whether or not he did stop, as both scenarios are possible mathematically.

This report is accurate within a degree of reasonable certainty in the field of traffic crash reconstruction. I reserve the right to amend or change my opinion upon the discovery of and review of additional evidence.

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ACTAR 1565